

ABSTRACT OF THE DISCLOSURE

The invention provides a method and system for reliably performing extra-long operations in a reliable state-full system (such as a file system). The system records consistency points, or otherwise assures reliability, notwithstanding the continuous performance of extra-long operations and the existence of intermediate states for those extra-long operations. Moreover, performance of extra-long operations is both deterministic and atomic with regard to consistency points (or other reliability techniques used by the system). The file system includes a separate portion of the file system reserved for files having extra-long operations in progress, including file deletion and file truncation. This separate portion of the file system is called the zombie filespace; it includes a separate name space from the regular ("live") file system that is accessible to users, and is maintained as part of the file system when recording a consistency point. The file system includes a file deletion manager that determines, before beginning any file deletion operation, whether it is necessary to first move the file being deleted to the zombie filespace. The file system includes a zombie file deletion manager that performs portions of the file deletion operation on zombie files in atomic units. The file system also includes a file truncation manager that determines, before beginning any file truncation operation, whether it is necessary to create a complementary file called an "evil twin". The truncation manager will move all blocks to be truncated from the file being truncated to the evil twin file. The file system includes a zombie file truncation manager that performs portions of the file truncation operation on the evil-twin file in atomic units. An additional

1 advantage provided by the file system is that files having attached data elements, called
2 "composite" files, can be subject to file deletion and other extra-long operations in a natu-
3 ral and reliable manner. The file system moves the entire composite file to the zombie
4 filesystem, deletes each attached data element individually, and thus resolves the compos-
5 ite file into a non-composite file. If the non-composite file is sufficiently small, the file
6 deletion manager can delete the non-composite file without further need for the zombie
7 filesystem. However, if the non-composite file is sufficiently large, the file deletion man-
8 ager can delete the non-composite file using the zombie filesystem.

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